

REPORT DOCUMENTATION PAGE		Form Approved OMB No. 0704-0188
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1. AGENCY USE ONLY (LEAVE BLANK)	2. REPORT DATE October 1998	3. REPORT TYPE AND DATES COVERED Technical Report
4. TITLE AND SUBTITLE Army Standard Location Object		5. FUNDING NUMBERS
6. AUTHOR(S) Leroy Jackson, Don Hodge, Brad Bradley		
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Director U.S. Army Materiel Systems Analysis Activity 392 Hopkins Road Aberdeen Proving Ground, MD 21005-5071		8. PERFORMING ORGANIZATION REPORT NUMBER TR-XXX
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) Director U.S. Army Materiel Systems Analysis Activity 392 Hopkins Road Aberdeen Proving Ground, MD 21005-5071		10. SPONSORING/MONITORING AGENCY REPORT NUMBER
11. SUPPLEMENTARY NOTES		
12a. DISTRIBUTION/AVAILABILITY STATEMENT APPROVED FOR PUBLIC RELEASE; DISTRIBUTION IS UNLIMITED.		12b. DISTRIBUTION CODE A
13. ABSTRACT (Maximum 200 words) Object-oriented programming offers the potential for increased code reuse, maintainability, and ease of developing entity-level simulations. Because of these benefits, the use of object-oriented technologies will increase over time. In order to prevent duplication of effort and the development of incompatible models, the Deputy Undersecretary of the Army for Operations Research (DUSA-OR) directed the development of an Army object management initiative to provide a foundation for Army object development. This report documents the standard Location Object that defines the minimum set of objects and object methods needed for the development of Location Objects in models and simulation.		
14. SUBJECT TERMS object oriented programming; modeling and simulation		15. NUMBER OF PAGES

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ACKNOWLEDGEMENTS .

The U.S. Army Materiel Systems Analysis Activity wishes to recognize the following individuals for their contributions to this report:

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ACRONYM LIST.

AMSAA - Army Materiel Systems Analysis Activity
AMSMPWG - Army M&S Management Program Working Group
ASTARS - Army Standards Repository System

CAA - Concepts Analysis Agency
CASTFOREM - Combined Arms Task Force Evaluation Model
CSS - Combat Service Support)

DUSA(OR) - Deputy Undersecretary of the Army for Operations Research

JWARS - Joint Warfare Simulation

ModSAF - Modular Semi-Automated Forces

NSC - National Simulation Center

OMSC - Object Management Standards Category
OMWG - Object Management Working Group
OOP - Object Oriented Programming

SAMSO - Standard Army Modeling and Simulation Object
SNAP - Standards Nomination and Approval Process
STRICOM - Simulation, Training, and Instrumentation Command

TRAC-FLVN - TRADOC Analysis Center Ft. Leavenworth
TRAC-MTRY - TRADOC Analysis Center - Monterey
TRAC-WSMR - TRADOC Analysis Center -White Sands Missile Range
TRADOC - U.S. Army Training and Doctrine Command

WARSIM - Warfighter Simulation

1. INTRODUCTION

This report documents the development of the Army standard Location Object. The notion of location is fundamental to most military simulations. There are numerous coordinate systems used in simulation; each appropriate for some simulations and not suitable for others. A common, abstract location object can foster interoperability among simulations that use different coordinate schemes.

2. BACKGROUND

Many of the current Army and Joint model development efforts have embraced the use of Object Oriented Programming (OOP) for their model development efforts. As a result, there has been a proliferation of competing object models. In 1QFY97, the Deputy Undersecretary of the Army for Operations Research (DUSA(OR)) formed an Object Management Working Group (OMWG) to propose a policy addressing the need for standards associated with Army M&S objects. The proposed policy developed by the OMWG recommended that the Army focus on a high-level object class structure independent of any specific simulation environment. This would allow M&S developers to tailor the high-level object standards to their specific applications through lower-level classes/instantiation that extend the standards to a specific M&S requirement. The overall impact in the development of standard abstract objects will be to organize future M&S along a common object structure to support interoperability, object reuse, and community understanding of the M&S. The proposed policy was briefed by the OMWG to the DUSA(OR) and was accepted in principle. AMSO subsequently formed the Object Management Standards Category (OMSC) in April 1997 to initiate the proposed policy. The OMSC mission is to:

- develop abstract objects for Army M&S functions,
- identify the minimum set of object methods/public data associated with the object function, and
- link the object methods to standard algorithms/data sources obtained from the other AMSO standard categories.

The OMSC is comprised of M&S practitioners to include those from the following agencies:

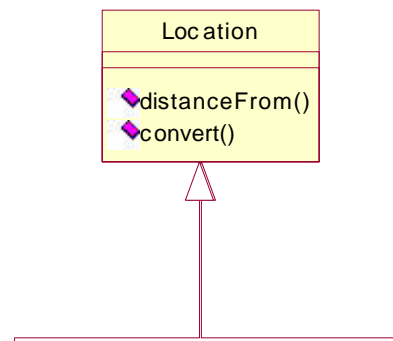
- TRAC- Monterey (TRAC-MTRY),
- TRAC-White Sands Missile Range (TRAC-WSMR); and
- Simulation, Training, and Instrumentation Command (STRICOM).

3. APPROACH

The OMSC reviewed the SAMSO study approach and output related to the draft Location Object. To gain a broader perspective on the application of the draft Location Object to other M&S domains, an overview of the draft Location Object was provided to the Army M&S Management Program Working Group (AMSMP WG) and the Army M&S Standard Categories for review. Comments were collected and reviewed to determine changes necessary to the Location Object needed to address differing M&S requirements. Based on the review and application to a set of M&S, an updated version of the draft SAMSO Location Object was developed and submitted to the Standards Nomination and Approval Process (SNAP) and the Army Standards Repository System.

4. LOCATION OBJECT DESIGN

The notion of location is fundamental to most military simulations. There are numerous coordinate systems used in simulation; each is appropriate for some simulations and not suitable for others. A common, abstract location object can foster interoperability among simulations that use different coordinate schemes



Class Location	An abstract class that provides a standard location scheme.
distanceFrom(Location)	Returns the distance from the location supplied as the parameter to this object's location.
convert()	Returns a Location object converted to the (unspecified) standard Location format.

Class Local	A class that provides location in a local coordinate scheme like UTM.
getXCoordinate()	Returns the value which represents the horizontal displacement with respect to the origin and orientation for this local coordinate system.
getYCoordinate()	Returns the value which represents the vertical displacement with respect to the origin and orientation for this local coordinate system.
getZCoordinate()	Returns the value which represents the distance above the reference plane for this local coordinate system.

Class LatLon	A class that provides location in a georeference scheme using latitude and longitude.
getLatitude()	Returns the latitude in seconds.
getLongitude()	Returns the longitude in seconds.
getAltitude()	Returns the altitude in feet.

In this example, the Location class abstracts the concept of location by providing a method to calculate the distance between locations and to convert to an unspecified standard location scheme. The Location class has two standard subclasses, Local and LatLon, which illustrate the two main competing coordinate schemes. Each provides location through 'get' methods.

5. LOCATION OBJECT APPLICATION/EXAMPLE

The Location object is powerful and flexible. This section will provide a discussion on the potential use and application of the Location Object

Another example on the potential applications of the Location Object deals with combat simulation. **Suppose**